

## 2008-02-01 Friday Pbar Morning Summary

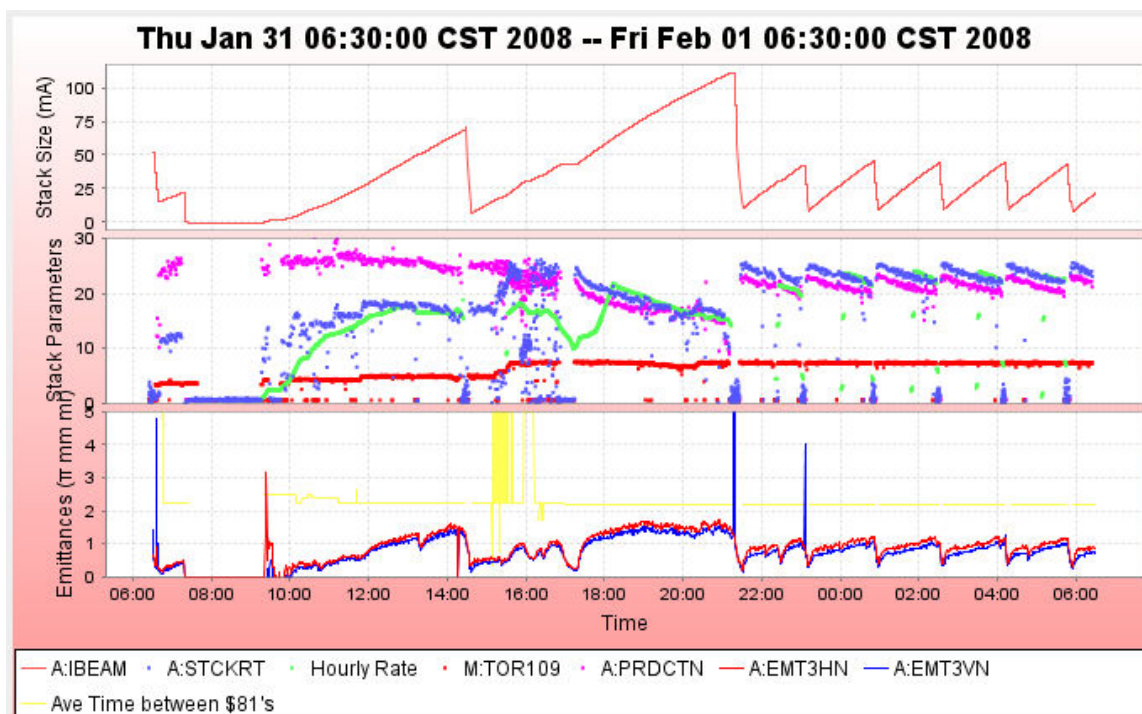
Thursday, January 31, 2008  
6:55 AM

### Stacking

- Protons on target were slow to come back
  - We ran only about  $4.2 \times 10^{12}$  at low turns through most of the day shift.
  - Through the evening and owl shift ran 10 turns most of the time with intensities about  $6.7 \times 10^{12}$ .
- We stacked a total of 368mA with our best hourly stack rate of 23.45mA/hr.
- Production efficiency averaged 20.42 e-6/proton, which is up due to the smaller beam on target.
- There was a glitch in the Accumulator bus cycling when turning on after the access, so we will need to cycle busses at some time.

### Transfers

- Sent 302mA in 22 transfers over six sets.
  - Accumulator to Main Injector Efficiency was  $\sim 97\%$
  - Accumulator to Recycler Efficiency was  $\sim 90\%$ , brought down by an 81% efficient transfer 7012.
- SDA issues
  - Minitables missing two A:IBEAM1 values for transfer 7015
  - Minitables missing I:BEAMS and I:BEAM6 for transfer 7012
- A 15 deg phase error has developed between ARF4 and the MI LLRF. This should be corrected before it gets any worse.



### Studies

# Studies

- Spot Size with lower intensity on target.

## Requests

- Cycle the Accumulator Busses
  - After a set of transfers.
  - Take an extra transfer, to minimize our loss of Pbars
  - Would like to do this during the day shift today.
  - The Pbar oncall or Stan will be present to make sure things go ok.
  - Interrupts stacking for 15-20minutes, and cleans out the Accumulator.
  - **Run Co approved this for today.** I talked to the crew chief about this after the 9am.
- Correct phase error between ARF4 and MI LLRF
  - Steve Werkema will make the change for one of today's transfers.
  - This will not add any time to the transfers.
  - If changes work, Steve will add them to the sequencer.
  - **This is approved.**
- One shot rapid transfers.
  - 21 second one shot timelines during stacking when Dave Vander Meulen is available.
- Debuncher Cooling Band 4 work
  - Dave Vander Meulen, Ralph Pasquinelli and Steve "Workin' Man" Werkema will do this study.
  - Study would take one circulating set of pbars in the Debuncher while in stacking mode.
  - Study is two hours long and requires no stacking.
  - **Run Co wants to hold off until later this weekend or next week on this study.**
- Debuncher Cooling Gain Ramp tuning
  - Initial efforts will be to just exercise the Debuncher momentum cooling gain ramps with small changes.
  - Stacking impact will be minimal, as this is more or less a tuning exercise.
  - This will lead to further studies over the next few weeks.
    - At that point, larger changes will be made and more studiers will be involved to make some careful measurements after making changes to the ramps.
    - Ramp changes may be a bit larger at that point and may impact stacking by a few percent or so for the duration of the study if TWTs occasionally trip during this study.
  - **Run Co says to hold off on Debuncher studies until at least this weekend.**

## Other

- Paul's Numbers
  - Most in an hour: 23.45 mA at Fri Feb 01 01:58:19 CST 2008
  - Best: 25.19 mA on 30-Jan-08
  - Average Production 20.42 e-6/proton Best: 25.41 e-6/proton on 01/30/2008
  - Average Protons on Target 5.52 e12 Best: 8.77 e12 on 07/24/2007
  - Largest Stack 111.21 mA Best: 271.01 mA on 11/14/2007
- Al's Numbers
  - Stacking
    - Pbars stacked: 367.63 E10
    - Time stacking: 20.59 Hr
    - Average stacking rate: 17.86 E10/Hr

- Uptime
  - Number of pulses while in stacking mode: 33366
  - Number of pulses with beam: 30596
  - Fraction of up pulses was: 91.70%
- The uptime's effect on the stacking numbers
  - Corrected time stacking: 18.88 Hr
  - Possible average stacking rate: 19.47 E10/Hr
- Recycler Transfers
  - Pbars sent to the Recycler: 334.63 E10
  - Number of transfers : 25
  - Number of transfer sets: 7
  - Average Number of transfer per set: 3.57
  - Time taken to shoot: 01.14 Hr
  - Time per set of transfers: 09.81 min
  - Transfer efficiency: 80.22%
  - Other Info
  - Average POT : 5.86 E12
  - Average production: 20.49 pbars/E6 protons
- Notch Filter Stability
  - i. Greetings,  
 I have done a quick analysis of delay stability for fibers and BAWs.  
 The ruby BAW has a temp co of 27 PPM/deg C  
 Standard fiber is 30 ps/km/deg C  
 Sumitomo fiber is 2 ps/deg C  
 compute and convert to Deg F because that is what we read back  
 For a 1.69 usec delay (1/590018Hz)  
 BAW is 25 ps/deg F  
 standard fiber 5.5 ps/deg F  
 Sumitomo fiber is 0.4 ps/deg F  
 The BAW is five times worse than regular single mode fiber and we observe this easily with the bypass BAW filter during measurements last week.  
 Today Steve and I looked at the fiber filter performance (see pbar log book) and did not see much variation in beam momentum over 30 minutes. This is commensurate with a temperature stability of less than 1 deg F for that oven (as data logged), which corresponds to around 3 PPM change in the notch filter for that oven swing. This is pretty good, a change to Sumitomo would be 15x better, but is clearly not our problem.  
 I propose that we try to make the BAW oven better by studying the gain parameters (Ed Cullerton), then do the same for the optical oven, but I do not expect we will see much improvement in stacking performance with Sumitomo notch filters. The optical switches are ready to go and would take 4 hours access to implement. Let's put them in at the first available opportunity.  
 I will post this note in the pbar log near todays measurement.  
 Ralph
- More notch filter stability
  - i. Hi ...  
 Just out of interest, the operators move the momentum notch filter once a day or so on the order of  $\pm 4$  steps, or a range of 8 steps; this trombone has 1/4ps resolution, so that works out to be 2.0ps of drift in the filter. Looking at the datalogger yesterday I measured a temperature drift of about 0.4F over 24 hrs, or for standard fiber (0.4 deg F) \* 5.5 ps/deg F = 2.2ps. So this appears to be the majority of the drift we see.  
 To reiterate, the new filter oven should have as large a thermal mass as is practical (no 1/4" aluminum plates) and lots of insulation!  
 -Dave

